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ABSTRACT

The findings of the Cost, Quality, and Child Outcomes (CQO) study in Child Care Centers, the largest and most visible child care research conducted in the 1990s, were widely publicized and used to promote increased spending on initiatives to improve child care quality, the redesign of subsidy systems to provide quality incentives, more stringent licensing regulations, and overall increases in teacher compensation. This paper examines the methodology and execution of the study to determine whether they were robust enough to justify confidence in the study's findings. Scrutinized in this report are the sample design, response rates, methods of measuring child care costs, methods of measuring quality, and analytic issues related to the cost and quality component and the developmental outcomes component. A limited reanalysis of the cost and quality data is presented to shed additional light on problems in the study methodology. The report asserts that the combination of problems of selection bias, low response rates, and attrition makes it difficult to identify the population to which the findings might be generalized. Also questioned was the use of the center rather than the classroom as the unit of analysis, which, it is argued, ignores differences in cost and quality of child care for children of different ages. The report ends with two sets of conclusions: (1) the findings highlighted in the CQO report summaries overstated the findings of the analyses and do not identify the impact of improving center quality on child outcomes; and (2) given the flaws in the methodology and implementation of the CQO study, the study's findings should be interpreted with caution. (KB)

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The Cost, Quality and Child Outcomes Study: A Critique

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Final Report

September 25, 2000

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Introduction

The Study of Cost, Quality and Child Outcomes in Child Care Centers, conducted by a consortium of respected academic researchers in the mid-1990s, was the largest and most visible piece of child care research conducted in the decade. Its results, and the conclusions drawn from those results, have been widely publicized and used by advocates to promote greatly increased spending on initiatives to improve child care quality, the redesign of public subsidy systems to provide incentives for higher-quality care, more stringent licensing regulations, and overall increases in the level of teacher compensation.

While other arguments can be marshaled in support of many of these goals, it is important to scrutinize carefully the "scientific "evidence used to advocate for them. Most activities aimed at increasing child care quality have the concomitant effect of raising the cost of that care. When parents pay for care, the result may be to place some kinds of child care beyond their reach. When public funds pay for child care, for a fixed level of resources, fewer children can be served. On the other hand, if a compelling case could be made that: a) care of a specified level of quality has a meaningful, (i.e., substantial and lasting) impact on the school readiness and performance of children who are otherwise at academic risk; and b) effective and reliable strategies exist to raise the quality of existing care to the level required to achieve such impacts, a compelling case could be made for vastly increased public investment.

The Cost, Quality and Outcomes Study examined the relationship between the cost and quality of early childhood care and education programs and developmental outcomes for children enrolled in child care centers in four states: California, Colorado, Connecticut and North Carolina. The four states reflect the academic home of the researchers rather than a more systematic representation of the diversity of licensing standards across the United States; nevertheless, the four represent a range of stringency of licensing standards. Within each state, a stratified random sample of approximately 100 centers was drawn from state licensing lists, with approximately equal representation of nonprofit and for-profit centers, all of which provided full-time care for infants and toddlers and/or preschoolers. Cost and quality data were collected during two-day visits to centers. Cost data were collected at the center level. A preschool classroom and an infant/toddler classroom (or two preschool or mixed classrooms, where no infant/toddler classrooms existed) were randomly selected to represent each program and observed. The center was then assigned a mean quality rating weighted by the number of classrooms of each type in the center.

A subset of the study centers, in which children could be observed for two years before entering school, was selected for the developmental outcomes component of the study. For this portion of the study, eligible centers were stratified by level of quality rating and economic status of children, randomly sorted, and then a quota sampling strategy was employed, i.e., researchers contacted centers in the order they were randomly sorted until the required number of children had been recruited and assessed. Developmental outcomes were assessed annually over a four-year period through individual child tests, teacher ratings and parent reports. Information on the family environment was gathered through parent interviews and on the school learning environment through observations.

The study findings are set forth in the first public report (Cost, Quality and Child Outcomes Study Team, 1995) and, more recently, in The Children of the Cost, Quality and Outcomes Study Go to School (Peisner-Feinberg et al, 1999). The major findings can be summarized as follows:

- Child care in most centers in the US is poor to mediocre.
- Children's cognitive and social development are positively related to the quality of their child care experience.
- Quality of care is strongly related to staff-child ratios, staff education and administrators' experience. Teacher wages, education and training also discriminate among centers of differing levels of quality.
- Higher licensing standards are related to higher observed levels of quality.
- Good quality services cost more but not a lot more.
- Children who attended higher-quality child care centers demonstrated better cognitive and social skills from preschool into the early elementary school years.

The primary purpose of this paper is to examine the methodology and execution of the study, in order to determine whether they were robust enough to give us confidence in the study's findings. We also report briefly on a limited reanalysis of the cost and quality data that sheds additional light on problems in the study methodology. The reanalysis was limited for several reasons: first, we were not able to gain access to the outcomes data; second, the documentation of the cost data was

inadequate in some respects. Most importantly, concerns about the effect of low response rates on the generalizability of the data suggested that we limit the analyses we conducted.

In the remaining sections of the paper we discuss issues related to the sample design and response rates; problems in the measurement and attribution of costs and quality; and analytic issues. The paper discusses what we learned from our limited reanalysis of the cost and quality data. The final sections of the paper discusses what we learned from our limited reanalysis of the cost and quality data. Two final sections briefly address the question, methodological issues aside, "Do the analytic results support the findings and recommendations set forth in the summary reports?" and present a set of conclusions.

Sample Design and Response Rates

Sample Design

Cost and Quality Component.

The CQO study used a multi-stage cluster sample design. In the first phase of the study (the cost and quality component), the first stage included a stratified random sample of 100 centers selected in each of the four states included in the study. Centers were stratified by for-profit and non-profit status, with approximately equal numbers of each included in the sample. In the second stage a stratified random sample of two classrooms was selected in each of the centers included in the sample. Classrooms were stratified by the age of the children served (less than 30 months, and 30 months and older). Classrooms serving school-age children were excluded from the sample. If a center included both infant/toddler classrooms and preschool classrooms, then one room was randomly selected from each stratum. If a center did not serve infants or toddlers, then two preschool classrooms were randomly selected.

The final sample for the cost and quality component included a total of 401 centers (201 for-profit and 200 non-profit), and 749 classrooms[1] (228 infant/toddler and 521 preschool). For center-level analyses, this sample provides a level of precision of □.05 (P=.50, • =.05), and statistical power of .80 to detect differences of about .25 standard deviations between for profit and non-profit centers. For classroom-level analyses, the sample provides a level of precision of □.07 for infant/toddler rooms and □.04 for preschool rooms.

[1] There were 51 centers with only one classroom.

Developmental Outcomes Component.

The developmental outcomes component was a longitudinal study of child outcomes. The sample of children for the developmental outcomes component of the study was nested within the classrooms in which quality was assessed. Each of the 401 centers included in the cost and quality component of the study was asked to participate in the developmental outcomes component. Only 45 percent (181) of the centers agreed to participate. Of these 181 centers, 151 were included in the developmental outcomes components. No reason was given for the exclusion of 30 centers that agreed to participate. A sample of 183 was selected from the preschool classrooms where quality was assessed during the first phase of the study. Eligible children included children who were expected to enter kindergarten in fall 1994, were enrolled in the target classroom during the quality assessment period, and who were expected to attend the same center the following year (Peisner-Feinberg, et al., 2000).

The final sample for the developmental outcomes component included a ***total initial sample*** of 745 preschoolers nested within 183 classrooms in 151 centers.[2] Outcomes for these children were measured in study years 1, 2, 3, and 5 (the last two years of preschool, kindergarten, and second grade). With attrition from the sample, only 352 children remained in the sample in year 5.[3] However, because of the clustering of children within centers, the ***effective sample sizes*** are considerably smaller. We estimate that the effective sample sizes are approximately 414 children in year 1 and only 196 children in year 5.[4] These sample sizes are too small to support the types of analyses conducted in the CQO. This issue is discussed in more detail below in the context of the unit of analysis and analytic techniques used by the CQO.

Apart from the adequacy of the sample sizes, the major problem with the CQO sample design is that the sample of children is limited to children who were expected to be in the same center in year 2

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[2] The authors report an initial sample of 826 children. However, the maximum sample size used in the analysis is 745 children. Incomplete data were available for the remaining 81 children recruited (Peisner-Feinberg, et al., 2000).

[3] The authors do not report the number of centers or classrooms remaining in the sample in year 5.

[4] The effective sample size is equal to the actual sample size (n) divided by the design effect (*deff*), where\

deff=1+[• (b-1)], and

• =intraclass correlation

b=average number of children per center.

The initial CQO sample has an average of 5 children per center. Since centers are likely to group children relatively homogeneously, we have assumed a relatively high intraclass correlation of • =.2. Under these assumptions, *deff*=1.8.

(Helburn et el. 1995, p. 38; Peisner-Feinberg, 1999, p. 3). The CQO study notes that this was intended to limit the sample to children "who had relatively stable child care situations." Since one would expect stability of child care arrangements to be influenced by many of the same factors that effect child outcomes, (e.g., household social economic status), the systematic exclusion of children of children with less stable child care arrangements introduces some degree of bias into the study estimates. The CQO does not provide any information about the number of children who were excluded from the sample because they did not return to the same center in year 2. Had the CQO included a small subsample of children who had a different child care arrangement in year 2, it would have been possible to estimate the magnitude of this bias. Unfortunately, this was not done in the CQO and one can only speculate as to the potential magnitude of this bias.

Response Rates

The response rates in the CQC study are quite low, raising the issue of potential nonresponse bias in the study estimates. In the cost and quality component, only 52 percent of eligible centers sampled agreed to participate in the study (Helburn, et al., 1995). Because the cost and quality of the centers that refused to participate in the study is unkown, this response rate is low enough to raise issues of potential bias. Had the CQO study conducted a study of cost and quality in a small subsample of the centers that initially refused to participate (perhaps by providing them with a monetary incentive sufficient to gain their cooperation), the magnitude of the potential bias could have been estimated. Again, this was not done and one can only speculate about the potential magnitude of the bias in the study estimates.

While the CQO study provides information on the response rate for the cost and quality component, it does not provide this information for the developmental outcomes component. The cumulative response in a multi-stage sample is equal to the product of the response rates for each stage of the design. The developmental outcomes component includes three sample stages:

Stage 1: Centers for the cost and quality component

Stage 2: Centers in the cost and quality component that participate in the developmental outcomes component

Stage 3: Parents in participating centers.

As noted above the Stage 1 response rate is 52 percent. The Stage 2 response rate is 45 percent (181 centers out of the 401 centers in the cost and quality component agreed to participate in the developmental outcomes component). The Stage 3 response rate was not reported. A total of 961

parent consent forms were returned, but no information is provided on the total number of these forms that were distributed to parents. However, if we assume that half of the children in each sample classroom are eligible to participate in the study, we estimate that the Stage 3 response rate was approximately 64 percent [based on the reported average number of classrooms per center (1.2) included in the sample, and the reported average class size (13.7).] The estimated cumulative response rate for the developmental outcomes component is only 15 percent. And this is before attrition from the sample. With such a low response rate and no evidence that non-responders are not meaningfully different from responders, one should treat the results of this component of the CQO study with considerable caution.

Measuring Costs

The protocol used by the CQO study to collect data on the costs of child care centers is the most comprehensive instrument that has been used to date by researchers trying to understand the costs of operating early childhood programs. Full-cost accounting requires that the cost of all resources used by a child care center be identified and attributed to center operations. As noted in the CQO study, these include costs incurred by a center and reported on its statement of income and expense as well as the value of in-kind contributions (e.g., volunteer labor and donated space). While the CQO study did an outstanding job of identifying in-kind contributions, their methodology for assigning a value to these in-kind contributions results in an ***over-estimate*** of the real value of these contributions to the center. In addition, including the value of foregone wages in their full-cost estimates results in a substantial ***over-estimate*** of costs. On the other hand, the CQO study may have ***under-estimated*** costs for child care centers that are part of a larger organization.

Assigning a Value to In-kind Contributions

The CQO study collected detailed information on the in-kind contributions received by child care centers and the prevailing market rates for the resources received. For example, if a center operated in donated space (e.g., a church basement), information was collected on the amount of space and the prevailing cost per square foot of similar space in the vicinity. The problem is that the CQO study ***did not apply a market test*** to the in-kind contributions. While the study asked centers what they would have had to pay for the in-kind contributions if they purchased them, the study did not ask if the centers would have purchased these resources had they not been donated. For example, a center may be given the use of a 4,000 SQFT church basement with a rental value of $4.00/SQFT. Suppose that this center has a planned enrollment of 35 FTE children. This works out to 114 SQFT/FTE child.

The CQO study would have assigned a value of $16,000 (i.e., 4,000 SQFT @ $4.00/SQFT) to this contribution. However, before assigning a value to this donated space, it is necessary to ask whether or not the center would have purchased (or rented) this much space had it not been donated. If, in the absence of donated space, the center would have only used 60 SQFT/FTE child, then including the value of the entire 4,000 SQFT substantially overstates the real value of the in-kind contribution to the center. Applying a market test to the contribution, we would only include the value of the amount of space the center would have purchased (or rented). The proper imputed value of the donated space is $8,400 [i.e., (35 FTE children) (60 SQFT/FTE child) ($4.00/SQFT). Unfortunately, it is not possible to re-analyze the CQO study dataset applying a market test to the in-kind contributions received.

Centers that Are Part of a Larger Organization

Many child care centers are part of a larger organization. For profit centers run by chains are but one example; in the nonprofit sector, centers are often one component of a multi-service agency (e.g., centers run by the YMCA or Catholic Charities). As a unit within a larger organization, such a center may be viewed as a cost center for which the management of the larger organization chooses to accumulate and report operating costs. As noted above, full-cost accounting requires that we include the cost of all resources used by a center. This includes costs incurred by the larger organization in support of center operations. These latter costs may or may not be charged to the center.

In some cases, these costs may be captured by an indirect cost rate and included in the costs reported on a center's statement of income and expense. In other cases, centers may be charged a fee-for-service for the support received from the larger organization, in which case they will be reported on a center's statement of income and expense. However, in many cases, the larger organization makes no attempt to capture these costs, in which case they are not reported on a center's statement of income and expense. The CQO study included costs incurred by the larger organization only to the extent that a center was charged (either directly or indirectly) for these support services. If a parent organization did not charge a center for these services, the CQO study under estimated the center's full cost. Unfortunately, it is not possible to identify and estimate the value of these unreported costs for child care centers using the CQO study dataset.

Foregone Wages

In calculating the full cost of care, the CQO study included the imputed value of foregone wages of center staff. The argument made for including foregone wages in the full-cost estimate is 'that center

staff subsidize the cost of care through their low wages' (Helburn, 1995). While it is certainly true that child care workers are paid low wages, the argument for including the value of their foregone wages in the full-cost estimate is spurious. As discussed above, the value of in-kind contributions should be subject to a market test--how much of these resources would the center have used if it had to pay for them. The wages paid to child care staff are determined by the local labor market, and by definition are subject to a market test. The supply of caregivers reflects their willingness to work in child care at the prevailing market wage. If child care workers had other (higher-paying) options that they preferred, they would not be working in child care at the prevailing wage rate for caregivers. That caregivers are working in child care indicates that either they don't have other higher-paying options, or their preference for child care work is worth more to them than the additional wages that they could receive in other employment. In either case, their foregone wages should not be considered as a cost of providing child care.

The inclusion of foregone wages has a major effect on the full-cost estimates. The value of foregone wages accounted for about half of the difference between total expended cost and total full cost. However, since foregone wages are clearly identified in the CQO study dataset, it is possible to improve the estimates of the full cost of care by excluding foregone wages.

Measuring Costs at the Center or Classroom Level

The Cost and Quality Study (as all previous studies of child care center costs) measured costs at the center level. While this is a fine approach for analyzing the cost of center operations (e.g., estimating the average cost per child-hour of care provided, and examining the components of center costs), it is problematic for examining the relationship between costs and quality. Quality is measured at the classroom level, not the center level. In the Cost and Quality Study two classrooms were randomly selected in each center included in the study. A weighted average of the quality measures for these classrooms was used as an estimate of the overall level of quality in the center (Morris & Helburn, 1997). The problem with this approach is that the center-level measure of cost may not reflect the costs attributable to the target classrooms that were used to construct the center-level quality measure. This may mask, or distort, the estimated relationship between cost and quality. Quite simply, both quality and cost should be measured at the classroom level and the level of analysis for examining the relationship between cost and quality should be the classroom not the center.

Approach for measuring cost at the classroom level. Commonly used in business, a system of functional accounts is designed to provide management with information regarding the cost of each of

the organization's activities. In general, an organization's activities fall into two broad categories: 1) the production of end products for sale to customers, and 2) management and service activities that support the production of end products. A system of functional accounts also facilitates the determination of the ***full cost*** of each of the end products.

The cost of management and service activities are viewed as ***indirect product costs*** in that they are not traceable to specific end products. In full-cost accounting, a share of each of the management and other service activities is allocated to each of the organization's end products. For example, in manufacturing it is common to distribute management and plant supervision costs in proportion to the number of employees engaged in the production of each product, while distributing maintenance costs in proportion to the value of the equipment used in the production of each product.[5]

In many respects, a child care center is no different from any other organization engaged in the production of several different end products. Despite the variation among child care centers in size, ages of children served, hours of operation, and organizational complexity, the major activities that form the basis of a system of functional accounts are relatively simple. The major activities are: 1) direct provision of child care, and 2) non-child care activities (including center administration, space, transportation, and food). In a functional cost analysis, all non-child care costs are seen as activities in support of the provision of child care. In this context, each classroom in a child care center may be viewed as a cost center (which is analogous to an end product). The cost of non-child care activities must be distributed to each classroom. The full cost attributable to each classroom includes its direct child care costs plus a share of the cost of non-child care activities.

The distribution of line-item cost elements to functional activities involves a combination of direct attribution and allocation. Labor costs are directly attributable to child care and non-child care activities. Salary schedules and work assignments may be used to identify the labor costs associated with each classroom and non-child care activities. Costs other than labor must be allocated across all of the classrooms in a center. There are several bases available for this allocation:

- the proportion of direct child care labor costs attributable to each classroom;

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[5] The concept of functional cost accounting and the issues involved in allocating the cost of management and other support activities to end products is contained in standard texts on managerial accounting. See Shillinglaw, Gordon and Phillip Meyer, *Accounting: A Management Approach* (Homewood, IL: Richard D. Irwin, Inc., 1983)

- the proportion of FTE caregivers assigned to each classroom;
- the proportion of FTE children enrolled in each classroom; and
- the proportion of total licensed capacity attributable to each classroom.

Labor cost and labor hours (i.e., FTE caregivers) are the predominant methods used by business. However, in a child care center, using FTE children is a viable alternative basis for this allocation. Since licensed capacity is, for the most part, determined by the amount of useable space in a center, using licensed capacity as the basis for the allocation is tantamount to allocating non-child care costs on the basis of the physical size of each classroom (a method that does not have much intuitive appeal in a labor intensive business such as child care).

The choice between using labor (either cost or FTEs) or FTE children is somewhat arbitrary. However, using labor as the basis for the allocation will have the effect of allocating a higher proportion of non-child care costs to classrooms with younger children, especially infant/toddler rooms, because of the higher staff/child ratios required for younger children. Conceptually, the question boils down to whether the use of administrative resources is more closely associated with dealing with staff or dealing with children/parents. Similarly, the use of labor cost will be sensitive to the staffing configuration of classrooms (i.e., for any given number of FTE caregivers, classrooms using more teachers and fewer aides/assistants would have higher labor costs). The decision about which method to use for the cost analyses should be based on a test of the sensitivity of the cost estimates to the allocation method used. If the estimates prove to be sensitive to the allocation method used, then it is necessary to present the full range of the cost estimates.

Measuring Quality

The set of measures used to rate the quality of the child care environment was comprehensive enough to allow the researchers to assess several different aspects of that environment. The ECERS (and its companion measure, the ITERS) is a 37-item scale that allows the observer to rate seven aspects of the environment. Each item is scored on a seven-point scale from inadequate to excellent, and a total score is computed to give an environmental rating. These seven subscales vary in their likely importance for the child's development, but carry the same weight in the overall score. For example, the four items that measure the extent to which the environment meets adult needs make the same contribution to the overall score as the four items items that assess the quality of children's language

and reasoning experiences. Nevertheless, the measure is widely used and highly regarded. Increasingly, it is used by states and localities, not only or even primarily as an evaluation tool but, as it was originally intended, as a diagnostic tool and a basis for prompting programs to work on improving the quality of the environment for children and adults.

The second measure, the Caregiver Interaction Scale (Arnett, 1989), fills a gap left by the ECERS and assesses the affective dimension of the caregiving provided. Using the scale, the observer rates the sensitivity, harshness, degree of attachment and permissiveness of the lead teacher.[6] The third measure, the Teacher Involvement Scale (Howes and Stewart, 1987), measures the amount and quality of the interactions between the teacher and the children in her care. Again, there is no indication that this measure was used on any but the lead teacher in each classroom (and only one subscale from this measure was used to compute the final overall score). A fourth observational measure was used to assess aspects of the school classroom environment, for those children who were followed into elementary school.

For the cost and quality component of the study, results from these three measures were combined in a principal components analysis to produce a single score for each of two the classrooms observed. A weighted average[7] of these two scores was then computed to create an overall index of the quality of the center environment.

The use of three different measures of environmental quality is admirable, and allows comparisons with several other studies. However, the ways in which scores from the measures were combined, analyzed and reported raise some issues. The combining of scores from two classrooms to create a center-level score would be a reasonable strategy if all the centers assessed had only preschool classrooms. But, in this study, some programs had infant and toddler classrooms, others had only preschool classrooms. Infant-toddler care presents more challenges than care for preschoolers. Center directors are under great pressure to provide care for infants and toddlers, as well as preschoolers. At the same time, the licensing standards for infant and toddler care are considerably more stringent than for preschool care, even in states with relatively lax requirements. For example, North Carolina at the time of the study allowed ratios of 1:18 or 1:20 for preschool classrooms, but required ratios of 1:6 for infants and toddlers. This could mean that infant-toddler care in the state

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[6] In some studies, both the lead teacher and the assistant teacher are rated and the ratings are then combined and averaged. In this study, only the lead teacher was rated.

[7] Scores were weighted by the number of preschool and infant and toddler classrooms in the center that each score represented.

was three times as expensive as preschool care, but that is usually not the case. If, instead, directors must try to cut corners to provide care that is somewhat affordable, it is likely that infant-toddler classrooms demonstrate wider variation in quality and, on average, are of lower quality. If either or both of these statements holds true in the CQO study, then the average quality rating of centers that contained both types of classrooms would automatically be lower than the average for centers that only had preschool classrooms. That is, the major factor responsible for the difference in quality would be the existence of an infant/toddler classroom. In the reanalysis of the cost/quality data that is reported later in the paper, we examined these questions. Our findings support the position that quality, however measured, should have been analyzed and linked to costs at the classroom level.

It is also important to add a note of caution about the statements made, mostly on the basis of the ECERS and ITERS, about the distribution of quality scores. The scores on the ECERS and ITERS are grouped in three categories – poor (average scores from 1 to less than 3), mediocre (average scores from 3 to less than five) and developmentally appropriate), but these are arbitrary divisions and cut-off points. Indeed the researchers themselves, though they describe and define each of these categories in detail, actually use a different grouping of scores in their later analyses, without discussion of their reasons (Peisner-Feinberg et al, 1999, p26).

The two reports (Cost, Quality and Outcomes Team, 1995; Peisner-Feinberg, 1999) describe the same analytic results in radically different terms. The first report states, as its first major finding, "Child care at most centers in the United States is poor to mediocre." The technical report, that accompanies it notes that the overall mean of 4.0 is a full point below good quality (Helbrun, 1995, p.26)). By contrast, the 1999 report, discussing the same set of analyses, states " the observed quality of child care experienced *by children in the study* (our italics) tended to be medium" (Peisner-Feinberg, 1999, p.8). What exactly does medium mean? The report goes on to elaborate. The average global classroom environmental quality score was 4.26 in year 1 and 4.05 in year 2 of preschool on the ECERS) "Teachers were rated as moderately sensitive (2.96 on a 4-point scale) were observed to be at least minimally responsive to a target child an average of 31% of the time. Children engaged in interactive play with peers an average of 77% of the time.....On average, the teaching approach observed in the classroom was slightly closer to a child-centered approach than a didactic approach (3.49 on a 1 to 5 scale)....teacher-child relationships tended to be positive, with teachers reporting relatively close relationships (mean of 4.17 for year 1 and 4.14 for year 2 on a 5-point scale) that were generally not overdependent or conflicted" (Peisner-Feinberg, 1999, p.8). In spite of the careful modifiers, this paints a picture different from and rosier than the first report, though both derive from

the same set of analytic results. Would it have generated the same level of attention as the statement in the first report?

If there is still confusion about what a score of 4 on a 7-point scale represents, here are some examples from the ECERS. A classroom would receive a score of 3.0 (minimal) if it had some appropriate gross motor equipment, but it was seldom in use, and a score of 5.0 (good) if gross motor equipment was "readily available and sturdy, stimulating a variety of skills, **and** if building and dramatic play equipment were included in gross motor areas." If one or a part of one of these statements could not be made, e.g., if dramatic play equipment was not included in the gross motor area, then the classroom would receive a score of 4. On an item assessing opportunities for teachers' professional growth, a center (this is not a classroom-level item) would receive a "minimal"rating if it had a limited professional library, staff meetings were limited to administrative issues and no in-service training was provided, and a "good" score if it had a good professional library, with current materials on a wide variety of subjects readily available, as well as regular staff meetings which include staff development activities as well as a plan for orienting new staff. A center with a limited professional library but all the other components of the "5" rating, would score 4 on this item.

These examples make one aware of how the ECERS can be used to sharpen teachers' and center directors' awareness of good practices. However, it is an open question whether the distinctions between points in the upper half of the scale are meaningful for policy research.

Analytic Issues

Cost and Quality Component

A significant issue in examining the relationship between cost and quality in early childhood programs is determining the appropriate unit of analysis. Typically, cost is measured at the center level, and this was the approach taken by the CQO study. However, quality is inherently a classroom variable, and the CQO study measured quality in a sample of two classrooms in each center. The issue then, is how to relate center-level costs to the quality of individual classrooms. The approach taken in the CQO study was to conduct the analysis using the center as the unit of analysis—the average quality of the two sample classrooms was taken as a measure of the overall quality of the entire center. This approach is seriously flawed. Costs clearly vary considerably from classroom to classroom—staff/child ratios vary across different age groups (and often within age groups), and the amount of space and other resou[illegible]ries across classrooms within a center. Indeed, an often cited

reason for not serving infants is that the cost of providing care to infants is considerably higher than the cost of serving preschool and school-age children.

Developmental Outcomes Component

There are two major problems with the developmental outcomes component of the study. The first, and most serious, is that the CQO study (in common with many previous studies of the relationship between child care quality and developmental outcomes) does not adequately control for the factors that influence parents' selection of child care arrangements for their children. Without adequate controls for the selection of children into child care arrangements, the CQO study estimates of the effects of child care quality on developmental outcomes are subject to selection bias. As Blau (1999) has noted, "parents who provide a home environment that fosters positive child outcomes would plausibly select child care arrangements that do so as well."

The CQO study collected a considerable amount of information on family characteristics, including both demographics and family practices and beliefs. The intent was to use this information to address the critical issue of self-selection. "The parental beliefs and family environment information provides further description of home environments in our sample and allows us to explore in more detail the relations between family characteristics to selection of child care and child development" (Piesner-Fienberg, et al., 1999, p.14). There is no evidence presented in the CQO study report that indicates that such analyses were conducted. Only three background variables were included in the analyses of developmental outcomes—maternal education, child's gender, and race. Using CQO study data, Blau (1998) has shown that including more family characteristics in a model explaining the quality of child care arrangements selected increases the explanatory power of the model (i.e., the proportion of the variance explained), but greatly reduces the sample size. He also notes that complete information was less likely to be available for children from disadvantaged households in lower quality child care centers. Despite the availability of information that could help explain child care selection, the CQO study limited their analysis of factors related to child care selection to maternal education, gender, and race , in part, "because these variables were available on almost all of the children in the sample (Piesner-Fienberg, et al., 1999, p.15)." It would have been helpful if the CQO study had conducted (and reported) parallel analyses using the more limited sample for which complete information on parental beliefs and family environment were available. In the absence of information to show that self-selection issues have been adequately addressed in the analysis, it is difficult to attach much credibility to the findings relating child care quality to developmental outcomes.

The second major analytic issue is the treatment of attrition from the sample. As noted above, there was a significant amount of attrition from the sample between year 1 and year 5. If those children that leave the study are different from those who remain in the study in ways that are related to developmental outcomes, then the study estimates of the relationship between child care quality will be biased. There is no indication that the CQO study examined the potential magnitude of such bias. Again, in the absence of information to show that the effects of selective attrition have been adequately addressed in the analysis, it is difficult to attach much credibility to the findings relating child care quality to developmental outcomes.

A Limited Re-Analysis of the CQO Study Data

The CQO study provided Abt Associates with the data files from the cost and quality component of the study. A limited re-analysis of these data was conducted to a) test the feasibility of measuring cost at the classroom level, and b) to examine the efficacy of conducting the cost and quality analyses at the classroom level rather than at the center level as was done in the CQO study.

Classroom Costs

Using the procedures described above, we calculated the full cost for each of the classrooms included in the study. Table 1 presents a simple comparison of the cost per child in infant/toddler and preschool classrooms. As would be expected, the average annual cost per FTE child is nearly 50 percent higher in infant/toddler classrooms ($6,422) than in preschool classrooms ($4,335).

Table 1: Comparison of the Cost and Quality in Infant/Toddler and Preschool Classrooms

	ITERS/ECERS		Annual Cost/FTE Child	
	Infant/Toddler	Preschool	Infant/Toddler	Preschool
Mean	3.5	4.3	$6,422	$4,335
Median	3.3	4.3	5,851	3,707
Std. Dev.	1.1	1.0	3,110	2,433
CV	20.7	23.1	48.4	56.1
N	206	463	216	472

This difference is statistically significant (P<.0001). This cost differential lends support to the argument that the cost and quality analyses should have been conducted at the classroom level rather than at the center level.

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Classroom Quality

The CQO study measured quality at the classroom level and then created a center-level measure of quality by taking the weighted average of the quality scores in the two sample classrooms.[8] While the CQO study examined several measures of quality, and developed an overall composite measure of quality based on the ECERS/ITERS, Arnett, and Howes Responsiveness measures, most of their discussion of quality is framed in terms of the ECERS/ITERS measure.[9] For this reason, we focused our limited re-analysis of quality on the ECERS/ITERS measure.

A comparison of the ECERS/ITERS of infant/toddler and preschool classrooms is shown in Table 1. Two things stand out in this comparison: a) the quality of infant/toddler classrooms is significantly lower than that of preschool classrooms (a mean ECERS/ITERS of 3.3 vs. 4.3); and b) quality is considerably more variable in infant/toddler classrooms than in preschool classrooms (CV of 30.7 vs. 23.1).[10] Given these differences, it is quite possible that the CQO study's center-level measure of quality is biased against centers that serve infants and toddlers. That is, because of the manner in which the center-level quality measure is constructed, we would expect that the center-level measure of quality would be lower in centers that serve infants and toddlers than in centers that only serve preschool children. To test this hypothesis we compared the center-level ECERS/ITERS in centers that do, and do not, serve infants and toddlers (Table 2). The ECERS/ITERS is significantly higher for centers that do not serve infants and toddlers ($P<.0001$) and is very similar to the difference observed between the classroom ECERS/ITERS measures.[11] This also lends support to the argument that the cost and quality analysis should have been conducted at the classroom level.

Table 2: Comparison of Center-Level ECERS/ITERS Scores for Centers with Infants/Toddlers and Centers with Only Preschool Children

Type of Center	Mean	Std. Dev.	N
Has Infant/Toddlers	3.7	0.89	219
No Infants/Toddlers	4.3	0.85	179

[8] The weights were based on the proportion of center enrollment in each of the two age groups.

[9] For example, The CQO study definition of high, medium, and low-quality centers is based on the seven-point ECERS/ITERS scale: less than 3 = low quality; 3-5 = medium quality; and 5-7 = high quality.

[10] The coefficient of variation (CV) is a measure of the relative variation. The CV = 100(Std. Dev./Mean).

[11] We also compared the center composite measure of quality with similar results. Centers that serve infants/toddlers had significantly lower scores on the center-level composite measure of process quality than centers that only serve preschool children.

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Relationship Between Cost and Quality

A simple linear regression analysis was conducted to assess the relationship between cost and quality at the classroom level, controlling for state and classroom type (Table 3). A statistically significant relationship of very low magnitude is observed between cost and quality. This relationship is different in North Carolina relative to the other three states. In California, Connecticut and Colorado, a $100 difference in the annual full-cost per child is associated with a positive difference of 0.010 on the ECERS/ITERS scale. However, in North Carolina a $100 difference in cost per child is associated with a positive difference of 0.020 on the ECERS/ITERS scale.

Of note is that the quality of infant classrooms is significantly lower than that of preschool classrooms, even after controlling for the differences in cost. One possible explanation for this is that centers use different types of staff in infant/toddler classrooms and preschool classrooms. For example, staff in infant /toddler classrooms had less formal education, less prior experience in child care, and less tenure in the center than staff in preschool classrooms.

Clearly, more work needs to be done in this area before we begin basing policy decisions on the purported relationship between cost and quality. However, if the above findings are any indication, we need to look beyond simply calling for higher expenditures on child care

Table 3: Relationship Between Cost and Quality at the Classroom Level (n=666)

Variable	Regression Coefficient	Standard Error	t Value
Annual Full Cost Per Child	0.000096	0.000019	35.66
Colorado	-0.19519	0.101.83	-1.92
Connecticut	-0.11790	0.10386	-1.14
North Carolina	-0.93020	0.17722	-5.25
Infant Classroom	-1.04138	0.17661	-5.90
Cost x North Carolina	0.000105	0.00003	3.15
Cost x Infant Classroom	0.000011	0.00003	0.69

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Do the Results of the Analyses Support the Findings and Recommendations?

The preceding sections of the paper have examined the strengths and weaknesses of the study design and its implementation. We now turn to the question of whether the results of the analyses that were carried out support the major findings and recommendations of the study.

The first widely-cited finding in the 1995 report states that **"child care in most centers in the US is poor to mediocre"** (Cost, Quality and Child Outcomes Team, 1995, p.26) As we noted earlier in the paper, the second report provides a more positive and more carefully phrased statement of the overall results of the quality analyses. It correctly limits the generalizability of the finding to the experience of children in the study. The results of these analyses cannot be generalized to centers in the US, since the states were purposively chosen and the distribution of the center sample in terms of the proportion that served infants and toddlers does not accurately reflect the distribution nationally. Center-based infant-toddler care is even rarer nationally than it is in this sample where less than a third of the centers had infant-toddler classrooms. In this sample, mean quality scores for centers were driven downward in those centers that had infant-toddler classrooms, because the quality of these classrooms was lower and more variable than the quality of their preschool classrooms. A more accurate statement of the results of the quality analyses would be that for almost 60% of the preschool classrooms in the study, the quality of the environment was medium to excellent (scores of 4.0 to 7.0), but that the proportion of infant-toddler classrooms that passed this threshold of quality was lower (32%). This would appropriately focus attention on the reasons for the disparity in quality scores and the problems that might be encountered in attempting to improve quality in center-based care for infants and toddlers.

The second major finding of the study, that **"children's cognitive and social development are positively related to the quality of their child care experience"** replicates the findings of many other studies (many of which were conducted by members of the CQO study team). Because there are no studies that have tested this proposition experimentally, most studies address the issue of possible selection bias by controlling for a set of family background variables, a strategy that this study also used. The problem is that, in addition to the variables that we can measure and control for (in this study, maternal education and the ethnicity and gender of the child were used as control variables), there exist a host of other unmeasured variables that indicate pre-existing group differences and that could influence parental selection of child care arrangements. If quality in

church-based centers is systematically lower, as the study found, what is it that leads parents to select this type of care?

We would conclude that the finding reasonably reflects the results of the analyses and should be read with the caveats about likely selection bias and, in this study, the added problems of response rates and attrition.

The third major study finding is that **"the quality of child care is positively related to higher staff-child ratios, staff education, and administrators' experience".** Teacher wages and specialized training also discriminated among centers with different levels of quality. What is not highlighted here is that the regression analyses managed to account for only half the variance in quality among centers. "Much of the difference in quality among centers was left unexplained" (Helburn, 1995, p.294). The authors of this portion of the report go on to suggest that what the results of their analyses call for is additional research on other aspects of child care quality. Another intriguing result of the analyses not highlighted by the authors is that teacher wages were only related to the quality of care when an average wage was calculated for all teaching staff and used in one set of analyses. In the econometric analyses, when wages for teachers with baccalaureates, with some college and with no formal education beyond high school were examined separately, only wage levels for staff with the lowest level of formal education were significantly related to quality. For teachers with college degrees, differences in wages did not affect the quality of the classroom environment.

Another widely-cited finding is that **good quality care costs more, but not much more**. The study estimates that it would cost an additional 16 cents per hour per child to raise the quality of the environment from medium (4.0) to good (5.0). As we noted earlier, we believe this analysis should have been conducted at the classroom level, differentiating between infant-toddler and preschool classrooms, because of the wide differences in costs and quality between the two types of classroom. In addition, and presupposing that we have reliable strategies for increasing quality between these two points at either the center or the classroom level, we are not told what this particular increase in quality buys us in terms of enhanced child development. In the second report, focusing on the longitudinal analyses of child outcomes, differences in outcomes are examined as a function of two extremes of quality: centers in the top 25% of quality vs. centers in the lowest 25% of quality ratings.

The last finding that is worth commenting on is the major finding in the second report that **children who attended higher-quality centers demonstrated better cognitive and social skills from preschool into the early elementary years.** Two points are worth making here. The first is that the

comparisons that are highlighted are between children who attended the highest quality centers and children who attended the lowest quality centers, although the analyses probably used quality as a continuous variable. We would like to have seen how children who attended "medium-quality" centers performed compared with children in "good-quality" centers, since those are the points that the cost-quality analysis focused on. Even with these extreme comparisons, the results are not very impressive. By second grade, most of the differences have disappeared. Of the six outcome measures used, there are effects of child care quality on two – math skills, and one of two social-emotional measures. The effect on the math score is between .1 and .2 of a standard deviation, an effect that is not considered educationally significant. We are not given enough information about the social-emotional measure to assess the importance of the effect. Finally, at this point, there has been additional and substantial attrition from the sample.

Conclusions

Our examination of the both the presentation of the study findings and the methodology and implementation of the design and analyses used to generate the findings leads us to two sets of conclusions.

First, the researchers, in particular the econometricians, carried out a series of careful analyses. Setting aside our arguments about the analytic strategies used and the appropriate level of analysis, we believe that the findings that are highlighted in the summaries of both reports overstate the results of these analyses. Further, after asserting that a substantial change in the average quality of centers could be effected for little additional expenditure, the researchers fail to identify for us what, if any impact this change would have on either short-term or long-term outcomes for children.

Second, we believe that the flaws we have identified in the methodology and implementation of the study should lead us to view the results of the analyses with caution. The combination of problems of selection bias, low response rates and attrition makes it difficult to identify the population to which these findings might be generalized. The use of the center rather than the classroom as the unit of analysis, which ignores the differences in cost and quality of child care for children of different ages, introduces additional problems.

Michael Lamb, perhaps the most clear-sighted of the researchers who have examined the relationships between child care quality and child outcomes, suggests that, while out-of-home care of superior quality is beneficial to children and preferable to care of poor quality, it is essential to

evaluate the relative costs and benefits of incremental improvements in quality, rather than to view "quality" as a magic bullet (Lamb,1992). The CQO study researchers have not provided us with insights into the cost-benefit trade-offs and they have offered us quality as a magic bullet.

We can agree that children's child care experiences, like their other experiences, influence their development, though not in obvious or simple ways. Perhaps the next wave of research will enhance our understanding of how children's experiences inside and outside their own homes combine to produce specific outcomes within different cultural and economic contexts.

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